

ABSTRACT

Relative to its size and in terms of its sedimentary processes, the Albemarle-Pamlico estuarine system is one of the least studied coastal bodies of water in the United States. This paper provides a synthesis of what we know about sedimentation in the Albemarle-Pamlico system, based on archived data published over the last 30 years and new, unpublished data, collected over the past 18 months. The literature reflects considerable past research effort on sediment grain size and mineralogy, but very little on flux of particulate material, or the role of sediments as a sink for pollutants and a source for regenerated nutrients.

The physiographic complexity of the system, which includes barrier islands, a deep central basin, four river systems, and extensive fringing embayments, does not appear to be reflected in the form of sedimentologic complexity. In general, the surficial cover of sediments ranges from medium sands in the inlets and on the shoals of the Outer Banks to fine silts and organic-rich clays in the central basin and embayed river mouths and channels. The transition zones from sands to muds are typically sharp and are usually related to bathymetry.

Much of the terrigenous sediment is apparently trapped in the lower courses of the major rivers by processes of estuarine circulation, even though sediments may be deposited and resuspended many times before coming permanently to rest on the bottom. The distribution of particle-reactive tracers in the lower Neuse River, the second largest contributor of sediment to the APES basins, suggests that deposition is related to focusing in a migrating turbidity maximum. Since the same mechanisms that concentrate fine-grained sediments may also concentrate heavy metals, pesticides, or other toxic substances that are adsorbed onto the surfaces of the sediment particles, preferential accumulation sites for organic-rich muds may thus be the accumulation sites for these toxic materials.

On the basis of sediment character it is reasonable to conclude that 1) parts of the Albemarle-Pamlico estuarine system may have high sedimentation rates relative to rates of sediment input and that rapid vertical flux by large aggregates offers an explanation for the fluid-mud deposits that would otherwise be absent, 2) fine-grained sediments that escape the estuarine sediment "trap" are confined to Pamlico Sound by the Outer Banks barrier islands and are simply recycled until finally coming to rest in the deep basin, 3) short-term advective processes are secondary to longer-term processes, such as sea level rise and barrier island migration, in the net advection of Albemarle-Pamlico sediments, and 4) at the present rate of terrigenous sediment input and relative sea level rise the Albemarle-Pamlico estuarine system will never reach a sediment-filled state.